Maryland
Department of
the Environment

Larry Hogan
Governor

Boyd Rutherford
Lieutenant Governor

Ben Grumbles
Secretary

December 2, 2016

The Honorable Edward J. Kasemeyer
Chair, Senate Budget and Taxation Committee
Miller Senate Office Building, 3 West
11 Bladen Street
Annapolis, MD 21401

The Honorable Maggie McIntosh
Chair, House Appropriations Committee
House Office Building, Room 121
6 Bladen Street
Annapolis, MD 21401

Dear Senator Kasemeyer and Delegate McIntosh:

On behalf of the Bay Cabinet agencies, The Maryland Department of the Environment (MDE) is submitting the Historical and Projected Chesapeake Bay Spending Report as required in the 2016 Joint Chairmen's Report. The agencies were required to report on recent and projected Chesapeake Bay restoration spending and associated impacts, and on the overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay. The agencies were also required to report on policy innovations that improve the effectiveness of Maryland and other states' efforts toward Chesapeake Bay restoration.

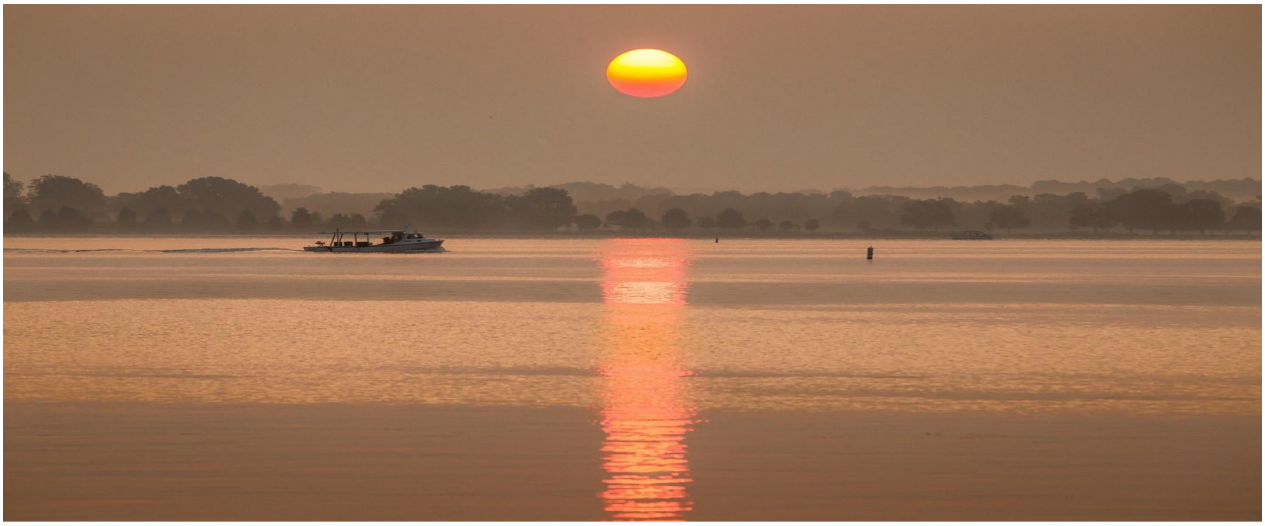
If you have questions or need additional information on items included in the report, please contact me or have a member of your staff contact Terri Wilson, Director, Office of Budget and Infrastructure Financing at 410-537-4155 or by email at *terria.wilson@maryland.gov*.

Sincerely

Ben Grumbles
Secretary

cc: The Honorable David Brinkley, DBM Secretary
Andrew Gray, DLS
Terri Wilson, Director, MDE Office of Budget and Infrastructure Financing
Jeffrey Fretwell, Director, MDE Legislative and Intergovernmental Relations

Historical and Projected Chesapeake Bay Restoration Spending



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December 2, 2016

FINAL REPORT

Maryland Department of the Environment

Maryland Department of Natural Resources

Maryland Department of Agriculture

Maryland Department of Planning

Maryland Department of Budget and Management

Executive Summary

The Chesapeake Bay Total Maximum Daily Load (TMDL) is a comprehensive "pollution diet" to restore the health of the bay and its local streams, creeks and rivers. The Chesapeake Bay Total Maximum Daily Load – the largest such cleanup plan ever implemented by the U.S. Environmental Protection Agency (Environmental Protection Agency) and developed in close collaboration with Maryland and all bay watershed states – sets limits on nitrogen, phosphorus and sediment pollution necessary to meet water quality standards in the Bay and its tidal rivers. The importance of clean water is also directly captured in three of the ten goals that are part of the Chesapeake Bay Watershed Agreement and strongly linked to the other seven goals.

The Bay Total Maximum Daily Load was prompted in 2010 by insufficient voluntary restoration progress up to that point, and resulting poor water quality in the Bay and its rivers. The Total Maximum Daily Load is designed to ensure that all pollution control measures, both upstream and downstream, needed to fully restore the Bay and its tidal rivers are in place by 2025 (with at least 60 percent of pollution reductions completed by 2017) and those pollution load limits are maintained even as we grow beyond 2025.

Evaluation of Maryland's current progress and the projections of the expected pollution reduction practices indicate that the load reduction path to the year 2025 will not be linear. This is explained by evaluating individual source sector progress and projections for wastewater, agriculture, stormwater from developed areas and septic systems, all of which are progressing at different rates. Stated more simply, both the wastewater and agriculture sectors have been reducing nutrient pollution much faster than the stormwater and septic sector. These differences reflect policy, engineering and funding realities.

In Fiscal Years 2000 – 2016, the state spent about $7.3 billion on Chesapeake Bay restoration activities. This amount includes funding for activities that directly reduce nutrient and sediment inputs to the Bay (e.g. cover crops and wastewater treatment plant upgrades), activities that indirectly support bay restoration (e.g. monitoring, education, outreach), and activities that prevent or minimize future degradation of the Bay (e.g. land conservation). Recent actions that are important to highlight are 1) the full funding of the Chesapeake Bay and Atlantic Coastal Bays Trust fund, which is the first time this full funding has occurred in the history of the fund; 2) an increased focus on cost efficiency in both the Bay Restoration Fund and the Trust Fund; and 3) the efforts toward the development of an operational Water Quality Trading Program.

During the period (Fiscal Year 2000 - Fiscal Year 2016) the state successfully took actions that will reduce Chesapeake Bay loads of nitrogen by an estimated 13.6 million pounds (22 percent reduction), phosphorus by an estimated 0.8 million pounds (22 percent reduction), and sediment by an estimated 342 million pounds (22 percent reduction). Corresponding

reductions in Bay water concentrations of nitrogen have been documented at 38 percent of long-term water quality monitoring stations, reductions in phosphorus have been documented at 50 percent of monitoring stations, and reductions in total suspended solids at 16 percent of monitoring stations.

To meet the requirement of the Total Maximum Daily Load, the state must reduce its pollution to the Bay by more than 10 million pounds of nitrogen and 0.5 million pounds of phosphorus from 2010 levels. These reductions will come, in aggregate, from four key source sectors: point source wastewater, agriculture, urban stormwater and on-site septic. Current estimates of nitrogen sources indicate that agricultural lands represent about half the load, point source wastewater is about a quarter of the load, urban stormwater runoff contributes about 20 percent of the load and on-site septic systems contribute about 5 percent of the load.

Projections forward from Fiscal Year 2016 through our goal in 2025 indicate that continued progress to achieving Maryland's goal will be challenging but not impossible. As we approach the 2017 mid-point assessment and begin to develop the Phase III Watershed Implementation Plan, we have the opportunity to continue our efforts to place Maryland on a fiscally responsible path to 2025. The next phase in the process, resulting in a draft Phase III WIP due to EPA in August 2018, will be to refine the implementation strategies to ensure that the necessary policies, regulations and financing structures are in place to achieve restoration success in the long-term (2025 and beyond), and also address critical issues such as the sediment and associated nutrient build up behind the Conowingo Dam.

Under the authority of the Chesapeake Bay Total Maximum Daily Load Accountability Framework, all Bay watershed states are required to meet 60 percent of the Total Maximum Daily Load required load reductions by 2017 and 100 percent by 2025. Primary pollution reduction drivers in Maryland are:

1. Use of the Bay Restoration Fund (BRF) for upgrades to major wastewater treatment plants;
2. Implementation of agricultural pollution reduction practices funded through the Maryland Agricultural Cost Share Program, Bay Restoration Fund and the Chesapeake & Atlantic Coastal Bays Trust Fund (Trust Fund);
3. Atmospheric pollution reductions resulting from the Clean Air Act; and
4. NPDES Municipal and Separate Storm Sewer System (MS4) Permit requirements.

A 2015 assessment by the University of Maryland Environmental Finance Center (Environmental Finance Center) reported that, "Our analysis indicates that the resources are in place to achieve interim and final restoration targets. In other words, no new state-based fees or taxes are required moving forward." This conclusion was based upon three important caveats. First, the state temporarily applies the expected excess wastewater treatment plant allocation (i.e. urban growth capacity) to offset expected shortfalls in the stormwater and septic

sectors at 2025, and then builds the capacity for growth back into the system. Second, the current level of environmental regulation that are drivers for pollution reductions will be maintained within each of the four pollution sectors and that enforcement will be consistent and effective. And third, that the current state Chesapeake Bay grant programs (primarily the Bay Restoration Fund and Trust Fund) are fully funded through 2025 and the funds are allocated in the most cost effective manners possible.

The Environmental Finance Center's conclusion that Maryland has the resources to achieve its 2025 Total Maximum Daily Load requirements is encouraging and the governor's Chesapeake Bay Cabinet recognizes the economic, social and policy challenges associated with the caveats above. Accordingly, the Bay Cabinet has identified six elements of Maryland's Bay Restoration Framework that will be used to address the caveats and guide the state's strategies moving forward.

1. Use wastewater treatment plant growth allocations wisely to preserve future options for local growth and identify solutions to build capacity back into the system.
2. Mitigate the future impact of growth in pollutant loads.
3. Focus on pollution reduction targets and transition to a credit based financing and accounting system.
4. Reaffirm that restoration responsibility starts and ends with the states.
5. Complete a strategy to address the estimated $5.1 billion cost to implement remaining nutrient and sediment reductions.
6. Recognize that success doesn't end in 2025.

In summary, Maryland is expected to reach its Chesapeake Bay Total Maximum Daily Load 2017 midpoint goal and its 2025 goal is within reach. Maryland's framework for achieving the nutrient and sediment reduction targets by 2025 recognizes the need to preserve and use existing state revenues in the most cost-effective way and ensure that every dollar spent results in multiple benefits. The framework also recognizes that progress among pollution source sectors is uneven over time and that expected shortfalls in some urban sectors will need to be covered by anticipated surpluses in the wastewater sector on a temporary basis. Finally, in addition to traditional tools, successful Bay restoration will also include innovative financing, transparent public-private partnerships, and market-based approaches that drive costs down and promote innovative technologies.

In recognition of the fact that success is based on the need to continually explore and implement new financing opportunities not just in Maryland, but throughout the watershed, the Chesapeake Bay Program worked with the University of Maryland Environmental Finance Center to hold a two-day Environmental Finance Symposium in April 2016. The symposium involved over 130 finance and Bay restoration leaders from throughout the watershed, and identified a suite of recommendations for further consideration. Maryland is actively working with our Chesapeake Bay Program partners to further evaluate opportunities presented by

these recommendations. In the meantime, Maryland's Bay Cabinet continues to implement existing innovative Bay financing opportunities within the State, and has identified a subset of new financing opportunities, which it will consider in 2017 for state-specific implementation.

Introduction

The policies and programs implemented since 2007 have placed Maryland on a path toward achieving its share of the Chesapeake Bay nutrient and sediment pollution reduction target by the year 2025. These reductions are necessary to achieve a restored Bay and meet obligations under the federal Clean Water Act.

With the policies and programs in place, particularly the Bay Restoration Fund and the Chesapeake and Atlantic Coastal Bays Trust Fund, Maryland continues to make progress toward the Total Maximum Daily Load (TMDL) pollution reduction goal (Figure 1).

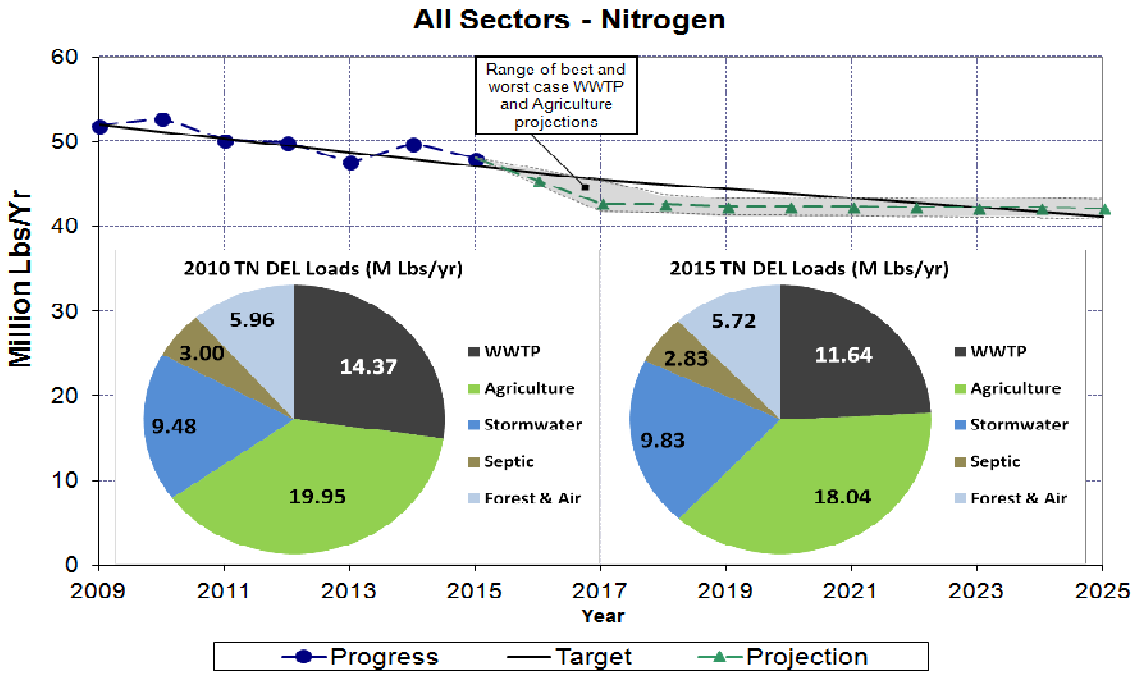

Figure 1. Total delivered nitrogen loads by sector.

These initiatives have doubled the rate of nitrogen load reduction and are necessary to meet our collective goal of a restored Chesapeake Bay. Also, these actions have addressed all pollutant sources including wastewater discharges, septic systems, agriculture, stormwater runoff and atmospheric deposition. Particularly critical to narrowing the gap was the doubling of the Bay Restoration Fund in 2012. That action set in motion the construction of enhanced wastewater treatment facilities that will enable Maryland to meet the 2017 interim target and the 2025 final target.

Although Figure 1 shows Maryland on a path to reach the 2025 final target, the pace of progress is different among the urban sectors. Stormwater and septic system sectors are expected to meet their ultimate goals sometime after 2025 and the wastewater treatment sector is expected achieve more than its ultimate reduction goal at 2025. In aggregate, the three urban sectors are anticipated to meet their combined reduction goal at 2025. This highlights the need for policies to account for growth and to continue making progress in the stormwater and septic system sectors after 2025 to help ensure future that capacity is available at wastewater plants.

This document is presented into four distinct parts:

- Part I is a brief background on Maryland's Chesapeake Bay Restoration that is now under the Total Maximum Daily Load Clean Water Act Framework.
- Part II documents state spending on Bay restoration through Fiscal Year 2016, the resulting estimated pollutant load reductions, and observed changes in water quality based on trends.
- Part III focuses on the overall framework needed to achieve the 2025 goal of having all best management practices in place to meet the required water quality standards for restoring the Bay.
- Part IV addresses several innovative financing options under consideration that will help enable the state to better meet its water quality restoration obligations.

Part I: The Chesapeake Bay Total Maximum Daily Load Accountability Framework

In 2010, after decades of voluntary efforts to fully restore the Chesapeake Bay, the United States Environmental Protection Agency (Environmental Protection Agency) established pollution load limits to restrict three major pollutants in the Bay's waters: nitrogen, phosphorus and sediment. These loading limits, which set clear goals for reducing excess pollution, are science-based estimates of the amount of each substance the Bay and its tributaries can receive and still meet standards for clean, healthy water. The goals, or pollution reduction targets, require the seven jurisdictions in the Chesapeake Bay watershed (Maryland, Virginia, Pennsylvania, Delaware, West Virginia, New York and the District of Columbia) to have pollution reduction practices in place by the year 2025 that will achieve these goals.

To ensure that all pollution control measures needed to restore water quality in the Chesapeake Bay and its tidal waters are in place by 2025 (with practices in place by 2017 to achieve 60 percent of the necessary pollutant load reductions), the Environmental Protection Agency developed an accountability framework, consisting of the Bay Total Maximum Daily Load "pollution diet" and the following four elements:

1. Bay jurisdictions' development of Watershed Implementation Plans ;
2. Bay jurisdictions' development of 2-year milestones to demonstrate continued progress;
3. Environmental Protection Agency's commitment to track and assess the jurisdictions' progress by implementing a Chesapeake Bay Total Maximum Daily Load Tracking and Accountability System; and
4. Environmental Protection Agency's commitment to take appropriate federal actions if the jurisdictions fail to:
   a) Develop sufficient Watershed Implementation Plans,
   b) Effectively implement their Watershed Implementation Plans, or
   c) Fulfill their 2-year milestones.

To provide reasonable assurance that the Total Maximum Daily Load pollutant reduction goals will be achieved, the Environmental Protection Agency directed the jurisdictions to develop Watershed Implementation Plans that detail specific actions each will take to meet their pollution reduction goals by 2025, and to achieve at least 60 percent of the necessary reductions by 2017. The Environmental Protection Agency recognized that the level of detail it expects the jurisdictions to include in their Watershed Implementation Plans would take time to develop and divided the process into three distinct phases with specific expectations:

- Phase I: Divide state-major basin target loads among non-point and point sources in 92 segments of the Bay. Identify strategies and practices to be put in place by 2017 to achieve 60 percent of the necessary pollutant load reductions.

- Phase II: Further divide load allocations among smaller geographic areas to help local decision-makers better understand their contribution to and responsibilities for reducing pollutant loads. Refine Phase I strategies in collaboration with key local partners to further ensure that the 2017 interim reduction targets will be met.
- Phase III: Make any mid-course adjustments to reduction strategies based upon new information, such as an increased understanding about phosphorus saturated soils, the changing conditions (infill) behind the Conowingo Dam, and water quality impacts from an ever-changing climate. States will also provide additional detail with respect to management actions and practices to be implemented in the 2018-2025 timeframe to meet final 2025 targets, propose any refinements to the Bay Total Maximum Daily Load allocations, and submit the final Watershed Implementation Plan to Environmental Protection Agency in December 2018.

Part II: Bay Restoration Funding and Progress to Date (Fiscal Year 2000 - Fiscal Year 2016)

Bay Restoration Funding: Since Fiscal Year 2007, the Governor's annual budget highlights have included a table of "Chesapeake Bay Restoration Activities Funded in the Budget". A gross summary table of Fiscal Year 2000 – Fiscal Year 2016 Bay Restoration spending is provided below (Table 1) and a more detailed table is attached as Appendix 1.

Table 1. Fiscal Year 2000 - Fiscal Year 2016 Maryland Bay Restoration Funding Summary

Category	Total Fiscal Year 2000 - Fiscal Year 2016 Funding Amount
Bay Cabinet Agencies (DNR,MDE,MDA,MDP, MDOT) Bay Restoration Funds	$4,288 M
Land Conservation(POS and Rural Legacy)	$581 M
Agricultural Land Preservation	$466 M
GO Bonds	$1,381 M
Transportation (FY15 and FY16 only)[1]	$550 M
Education (FY15 and FY16 only)	$55 M
Total	**$7.32 B**

Several very important caveats and approximations must be recognized in interpreting Table 1 and Appendix 1.

1. Data is not consistent over time: Records are less accessible and, therefore, reported funding amounts less reliable for the beginning of this time period than more recent years.

[1] Approximately $341 million of the $550 million Maryland Department of Transportation spending is for Red and Purple Line activities, while the rest is for more traditional Bay restoration BMPs.

2. Not all funding goes directly to reducing pollutant loads to Chesapeake Bay: "Bay Restoration" involves a diversity of important functions beyond simply reducing the amount of nitrogen, phosphorus and sediment entering the Bay. For example, water quality monitoring is essential to track progress and direct future actions to the most cost effective practices; education and outreach are important to providing Maryland students and citizens with access to and appreciation for a restored Bay; and Smart Growth and land conservation programs minimize growth impacts and protect the Bay from future degradation. All of these examples (and others) are essential aspects to Bay restoration, but do not directly result in reductions in pollutant loadings to the Bay. As a result, it is inappropriate to simply divide the total cost presented in this report by the number of pounds pollutant reduction to get a dollar amount per pound reduced.
3. Judgment calls are necessary in identifying a program as "Bay Restoration": Many state agency programs and budget categories contribute to restoration as well as other non-Bay related efforts. In an effort to remain as consistent as possible, only those programs that have more than 50 percent of their activities related to Chesapeake Bay restoration are included in this analysis.

Although the total funding by Maryland state agencies for Bay restoration varies from year to year, the total restoration funds for the first three years of the evaluated time period (Fiscal Year 2000 – Fiscal Year 2002) was $882,327,165, while the total for the past three years of the period (Fiscal Year 2014 – Fiscal Year 2016) was $2,325,558,958, an increase of 164 percent. This increase was driven in part by the creation and subsequent increases in the two primary Bay restoration Special Funds: The Bay Restoration Fund and the Chesapeake and Atlantic Coastal Bays Trust Fund.

Bay Restoration Progress 2000 – 2015 as per Reported Implementation: The Environmental Protection Agency Chesapeake Bay Program Model uses States reported implementation combined with the best scientific understanding of the amount of nitrogen, phosphorus and sediment running off of different land use types in the watershed, applies it to our current use of land in Maryland, and estimates the resulting amount of those pollutants entering Chesapeake Bay from Maryland. This calculation is not currently able to account for the delay between when a pollutant leaves a parcel of land in the watershed and when it finally enters the Bay. These Modeled estimates, therefore, are designed to indicate the expected outcome at some point in the future based on our reported implementation actions as of today.

Figure 2 presents the modeled sector source contributions of Maryland's loads to the Bay as of actions in place in 2015.

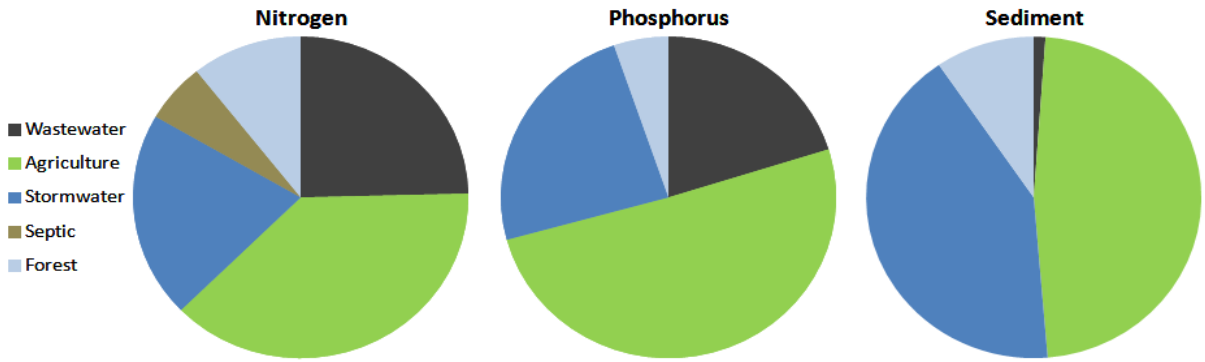

Figure 2. 2015 Modeled Maryland loadings to the Bay by sector source.

Figure 3 displays the nitrogen, phosphorus and sediment loads to the Chesapeake Bay from the Maryland portion of the watershed. Loads are provided for the years 2000 and 2015, and are obtained from computer simulations from the Chesapeake Bay Program Phase 5.3.2 Watershed Model. Maryland's actions through 2015 are expected to have been successful at reducing nitrogen loadings by 22 percent, phosphorus loadings by 22 percent and sediment loadings by 22 percent.

Changes in loads can result from changes in conservation practices, land use, air deposition, animal population estimates, septic systems and precipitation. A description of the changes that occur in each sector are as follows:

- *Agriculture:* The sector makes up the largest contribution of nutrients and sediment to the Bay. It has also made steady reductions. The sector sees reduction both from management practices as well as the loss of land to development. Management practices are implemented on at least 70 percent of the sector area. Agricultural land area has decreased by seven percent. Reduction in phosphorus through Best Management Practice implementation is supplemented with lower than anticipated poultry population estimates based on latest agricultural census data.
- *Urban Stormwater:* The sector makes up the second largest contribution of nutrients and sediment to the Bay. Atmospheric deposition is a major nitrogen source in the urban environment and implementation of air pollution reduction strategies in the region is a key driver of nitrogen reduction. Phosphorus reductions are due in part to fertilizer management. Trends have been relatively flat because restoration practices have kept pace with the addition of new loads from new development. The development sector land area has increased by 17 percent since 2000 as a result of the conversion of forest, agricultural and open land to development. Since 2010, new development has to meet Environmental Site Design to the Maximum Extent Practicable. Currently 33 percent of the urban area has stormwater management.
- *Wastewater:* The sector makes up the third largest contribution of nutrients to the Bay and the smallest contribution of sediment. It has also achieved the greatest amount of

reduction. Changes in the loads from wastewater treatment plants are a combination of the upgrades of municipal plants, closures of industrial facilities, growth and the impact of year-to-year rainfall variability.

- *Septic Systems:* The septic sector has the least contribution of nitrogen to the Bay and contributes no phosphorus or sediment. Trends appear to be relatively flat because restoration practices have kept pace with the addition of new loads from new development.

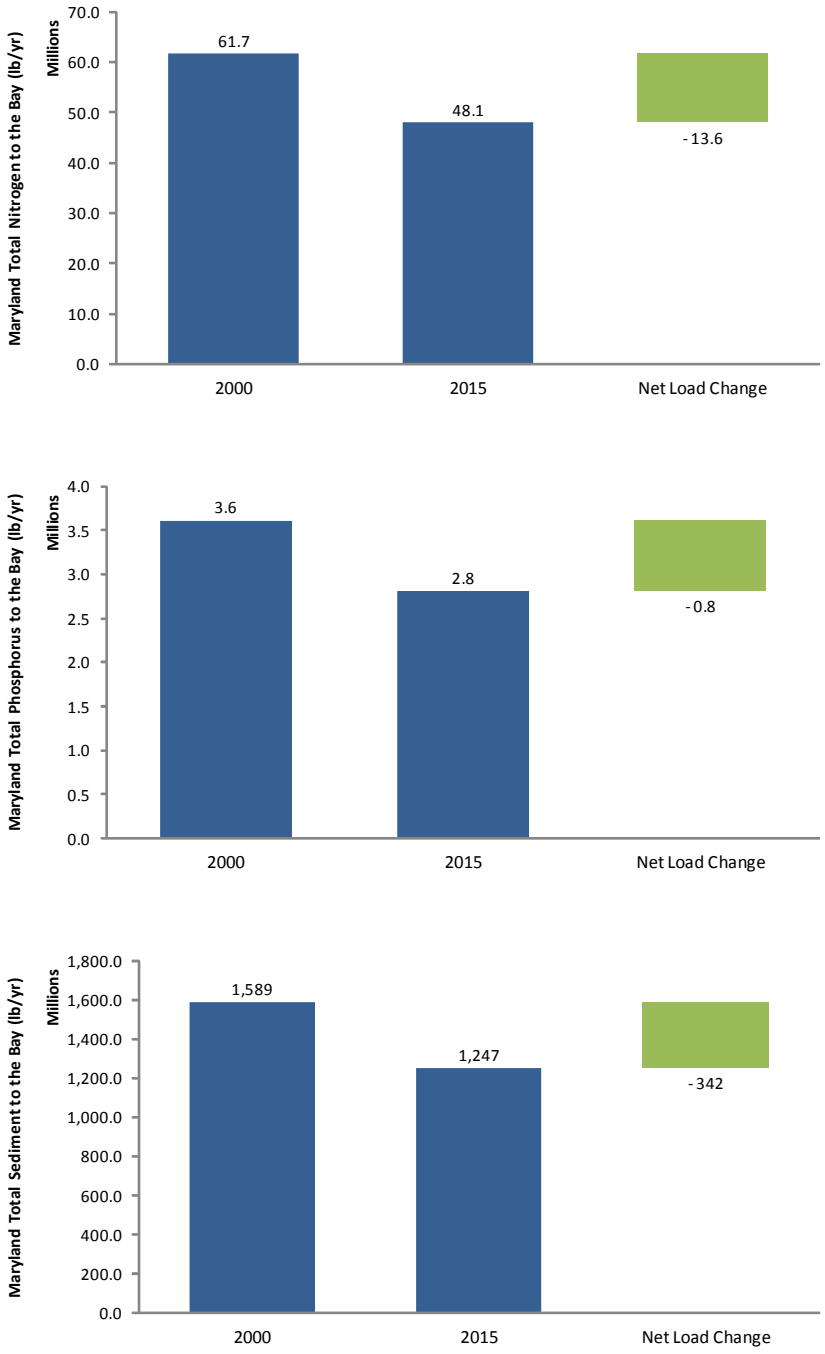

Figure 3. Maryland Modeled loads of nitrogen, phosphorus, and sediment from 2000 – 2015.

Chesapeake Bay Water Quality Monitoring Data: In order to understand the health of the Chesapeake Bay and track progress of restoration efforts, the state, through the Maryland Department of Natural Resources, regularly monitors tidal and non-tidal waters at 125 sites.

Statistical analysis of monitoring data collected at both tidal and non-tidal stations from 1999 through 2015 demonstrates that the current impact of historical Chesapeake Bay restoration spending has resulted in significant reductions in nitrogen concentrations at 38 percent of stations (Figure 4), phosphorus concentrations at 50 percent of stations (Figure 5) and sediment concentrations at 16 percent of stations (Figure 6).

Currently, the Environmental Protection Agency, Maryland, and the other Bay states staff are evaluating new statistical methods to assess water quality trends that will ultimately be adopted as the standard Bay-wide trend assessment methodology. Future years' reporting of water quality results will be based on these new methodologies.

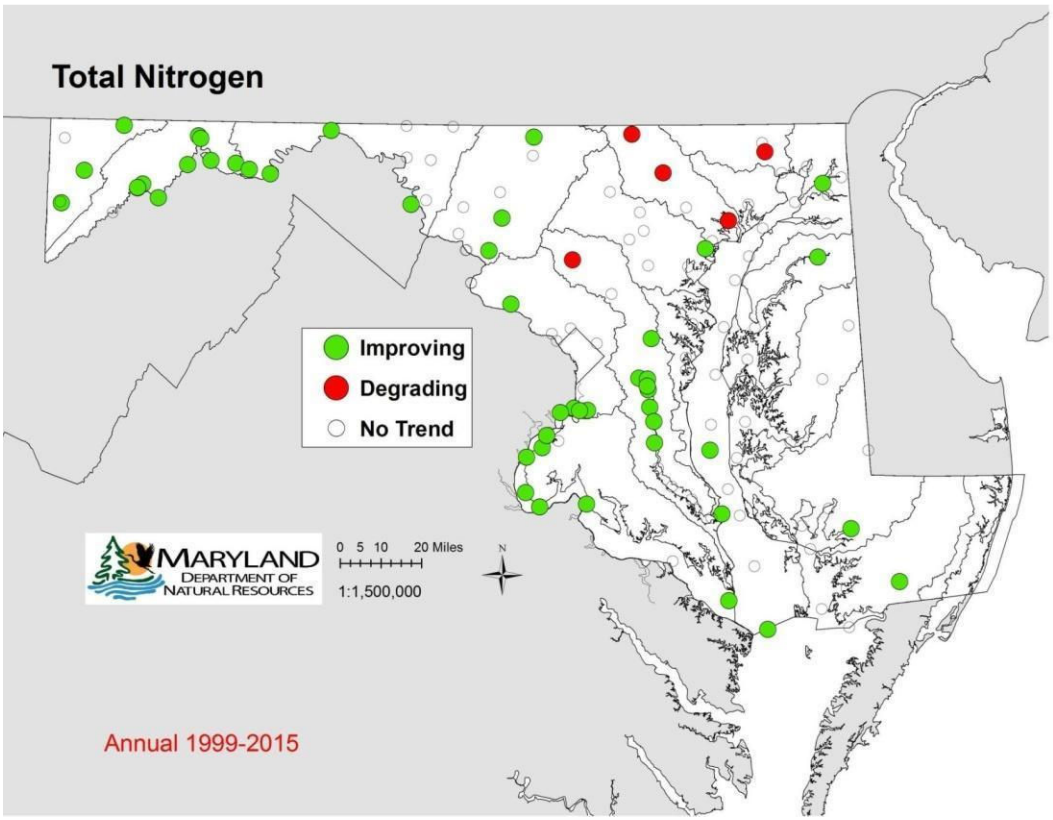

Figure 4. Trends in monitored total nitrogen concentrations 1999 – 2015.

- 38 percent of stations (47 of 125) are showing improving conditions since 1999
- 4 percent of stations (5 of 125) are showing degrading conditions since 1999
- 58 percent of stations (73 of 125) are showing no consistent change in conditions since 1999

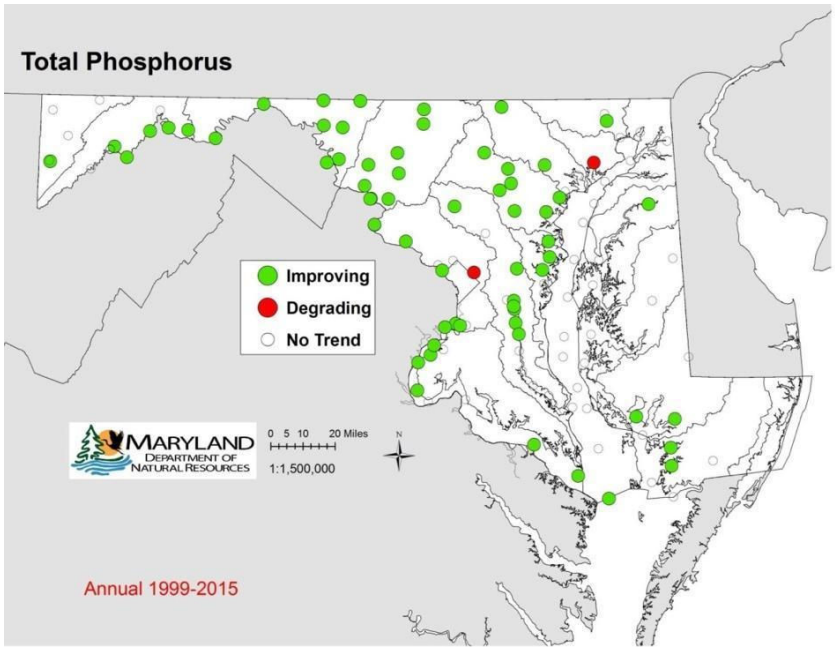

Figure 5. Trends in monitored total phosphorus concentrations 1999 – 2015.

- 50 percent of stations (62 of 125) are showing improving conditions since 1999
- 1 percent of stations (2 of 125) are showing degrading conditions since 1999
- 49 percent of stations (61 of 125) are showing no consistent change in conditions since 1999

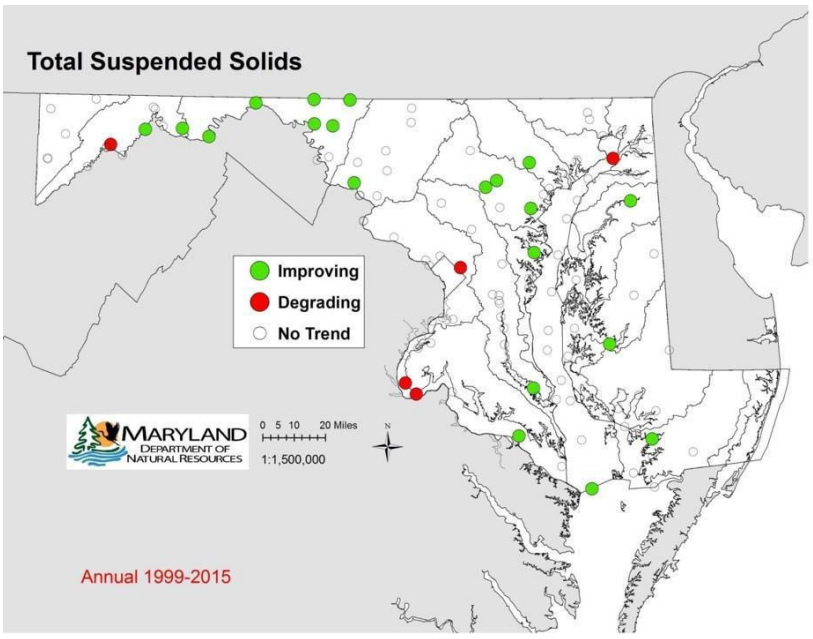

Figure 6. Trends in monitored total suspended sediment concentrations 1999 – 2015.

- 16 percent of stations (20 of 125) are showing improving conditions since 1999
- 4 percent of stations (5 of 125) are showing degrading conditions since 1999
- 80 percent of stations (100 of 125) are showing no consistent change in conditions since 1999

Monitoring results confirm that most of the improvements in nutrients and sediment reductions appear closest to the management actions in the streams and rivers within the watershed. As you move downstream, the tidal tributaries respond, especially on Maryland's western shore where point source reductions associated with wastewater treatment plant upgrades have a more immediate impact to water quality improvements than non-point source impacts that have a more delayed response.

The Bay itself will take longer to respond to our management actions, but we are seeing improvements as we continue to implement and meet our reduction strategies. Our monitoring recorded more Submerged Aquatic Vegetation or sea grasses in 2015 since the monitoring program began in 1984 (Figure 7). We are also seeing some initial signs of improved bottom dissolved oxygen levels, a key parameter for all aquatic resources and an indicator of Bay health (Figure 8).

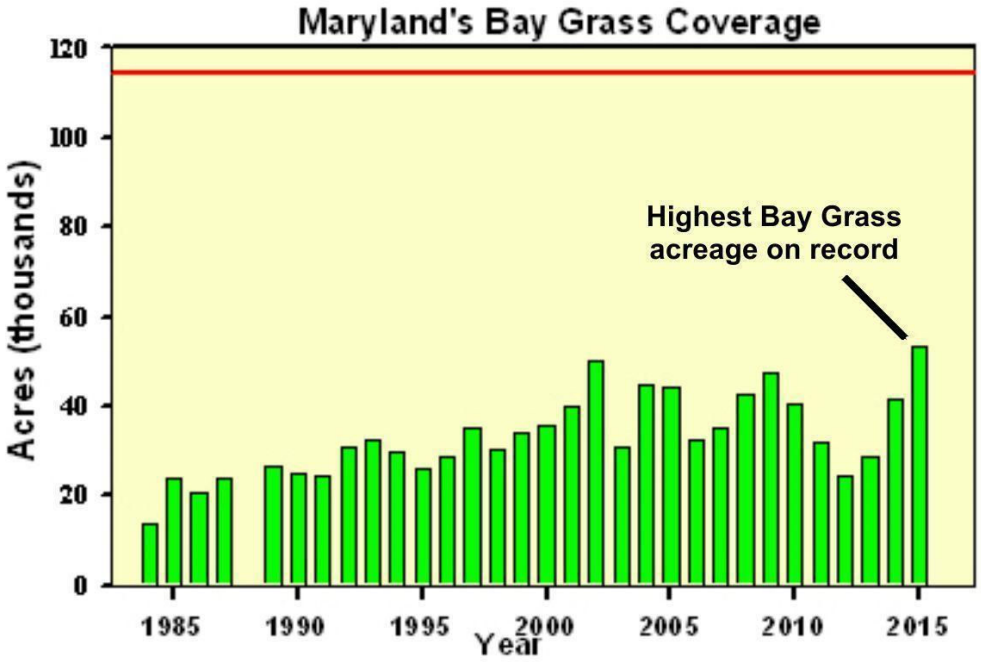

Figure 7. Total Submerged Aquatic Vegetation in Maryland's portion of the Chesapeake Bay, 1985–2015.

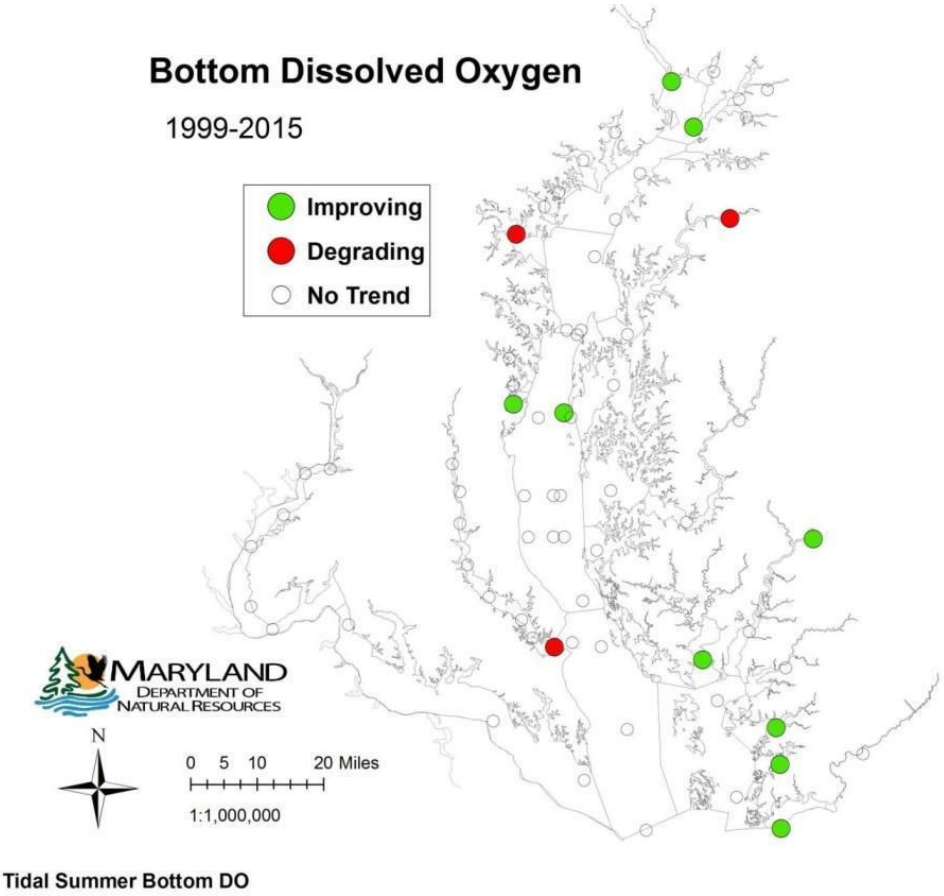

Figure 8. Trends in monitored bottom dissolved oxygen concentrations 1999 – 2015.

- 13 percent of stations (9 of 71) are showing improving conditions since 1999
- 4 percent of stations (3 of 71) are showing degrading conditions since 1999
- 83 percent of stations (59 of 71) are showing no consistent change in conditions since 1999

Despite the above referenced encouraging signs of improvements in Chesapeake Bay grasses and bottom dissolved oxygen, further action on nutrients and sediments are required to see continued movement in the right direction and corresponding improvements in tidal water clarity (Figure 9) and chlorophyll a (Figure 10).

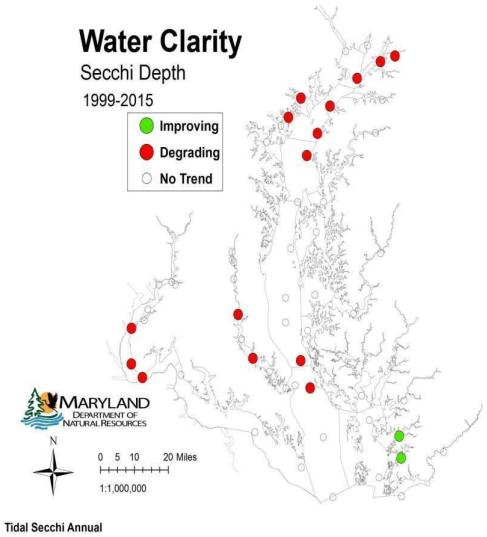

Figure 9. Trends in monitored water clarity concentrations 1999 – 2015.

- 3 percent of stations (2 of 68) are showing improving conditions since 1999
- 22 percent of stations (15 of 68) are showing degrading conditions since 1999
- 75 percent of stations (51 of 68) are showing no consistent change in conditions since 1999.

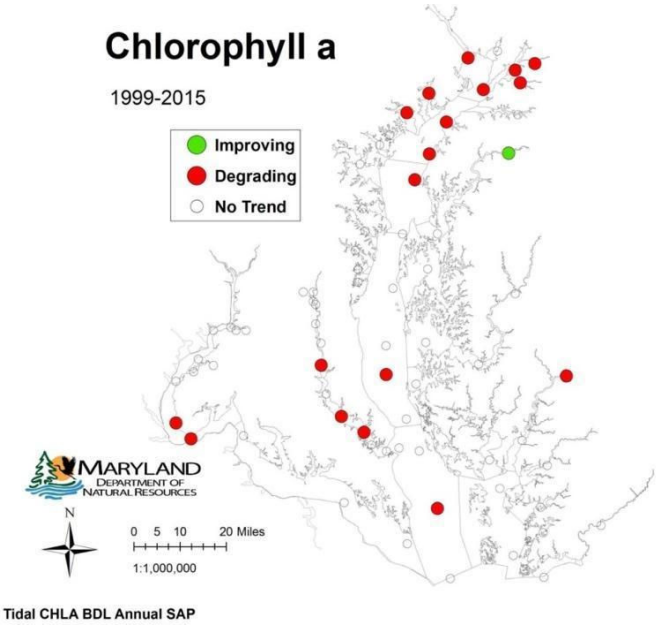

Figure 10. Trends in monitored chlorophyll a concentrations 1999 – 2015.

- 2 percent of stations (1 of 71) are showing improving conditions since 1999
- 25 percent of stations (18 of 71) are showing degrading conditions since 1999
- 73 percent of stations (52 of 71) are showing no consistent change in conditions since 1999

Part III: Framework for Bay Restoration 2016 - 2025

The first two phases of the U.S. Environmental Protection Agency's Watershed Implementation Plan process effectively established the pollution targets, responsibilities and initial strategies for achieving the required pollution reductions. The third phase in the process, to be completed by the end of 2018, will be to refine the strategies to ensure that the necessary policies, regulations, and financing structures are in place to achieve restoration success in the long-term (2025 and beyond). This section of the report provides recommendations and next steps for establishing the foundation for that success.

The following framework focuses on the necessary role of the state and the associated policies and financing resources needed for a successful restoration effort. Achieving pollution reduction targets will require the resources and engagement of multiple stakeholders and entities — public and private — working in concert over the coming years. However, the state has a unique leadership role in the restoration effort because the Environmental Protection Agency holds it responsible for achieving and maintaining Maryland's final pollution targets. The following framework, therefore, is intended to address the capacity of the state to lead the restoration effort subject to several key technical parameters.

I. Background – Pollutant Source Sector Status

The state must reduce its pollution to the Bay by more than 10 million pounds of nitrogen and 0.49 million pounds of phosphorus from 2010 levels. These reductions will come, in aggregate, from four key source sectors collectively: point source wastewater, agriculture, urban stormwater, and on-site septics.

Point Source Wastewater: Wastewater now represents about 25 percent of the nitrogen load in Maryland. Wastewater treatment in Maryland represents a true water quality financing and water quality improvement success. The combination of firm, enforceable regulations with a dedicated and consistent revenue stream in the form of the Bay Restoration Fund resulted in pollution reductions in the wastewater sector that also provides for future growth.

By 2017, investments from the Bay Restoration Fund will result in upgrades to Maryland's 67 major wastewater treatment plants. As of September 2016, 49 upgrades of major plants were completed, 14 were under construction and 4 were under design/planning. Minor wastewater treatment plants are also being upgraded using Bay Restoration Fund funding on a voluntary basis and when the upgrade is cost effective. As of September 2016, four were in operation, four were in construction, and ten were under design/planning stages. Minor plants will continue to be upgraded after 2017.

The next year is very important for this sector because completion of the upgrades is planned at the two largest wastewater treatment plants in Maryland (Patapsco and Back River).

Together with Blue Plains on the Potomac River, which completed upgrade in April of 2015, these three largest plants alone are expected to decrease nitrogen by about 4 million pounds.

After 2017, the major wastewater treatment plants will be upgraded to Enhanced Nitrogen Removal (ENR) levels and the largest reductions will have been realized. As a result of the ENR upgrades, wastewater sector will be below its allocations – in other words, the amount of nutrients collectively released by all major wastewater treatment plants into the Chesapeake Bay will be less than what is allowed by the Total Maximum Daily Load (i.e. the wastewater sector will have exceeded its goal).

This provides future growth capacity at Maryland's wastewater plants beyond 2025. It also places the urban sectors of wastewater, stormwater and septic systems, on a path to meet their combined reduction goal in 2025. The surplus reduction by the wastewater sector at 2025 will temporarily cover the slower pace of reductions that are anticipated by the stormwater and septic system sectors. However, after 2025, continued reductions in the stormwater and septic system sectors will help ensure that future capacity is available at wastewater plants.

Agricultural Lands: Nutrient loads from agricultural lands account for about half of the nutrient loads in Maryland. Implementing nutrient management plans, soil conservation and water quality plans, planting cover crops and maintaining buffers continue to be significant nutrient and sediment reduction practices for load reduction. Important to note is that in 2016 Maryland farmers planted a record amount of cover crops achieving increased nutrient reductions and improving soil health. Agricultural practices are funded in large part through the Chesapeake and Atlantic Coastal Bays Trust Fund, which was fully funded in 2016; the Chesapeake Bay Restoration Fund; and Maryland Agricultural Cost Share Program.

Additionally, the administration implemented the Agricultural Phosphorus Initiative, which will provide solutions through implementation of the Phosphorus Management Tool and complete an on-farm economic study to provide insight about the potential resource needs as the tool is implemented. This initiative enacts an immediate ban of additional phosphorus on soils highest in phosphorus and requires comprehensive information on soil phosphorus conditions to be reported every six years to monitor trends. It will also provide adequate time for farmers to fully understand and plan for new requirements phase-in full implementation by 2022; and assures agricultural producers that critical needs are identified for implementation.

Urban Stormwater: Urban stormwater represents about 20 percent of the nitrogen and phosphorus load in Maryland. The technical and social challenges of installing stormwater controls on existing developed land make this a costly and slow process, when compared to our progress in upgrading wastewater treatment plants. Consequently, restoration activities and associated reductions are anticipated to extend beyond 2025. However, the local water quality benefits, and long term benefits to the Bay, make these investments worthwhile for improving the quality of Maryland's waters. As noted elsewhere in this report, the installation of

stormwater controls on existing developed land will extend beyond 2025; however, the surplus reductions by the wastewater sector at 2025 are anticipated to make up the difference so that the urban sources, in aggregate, are within reach of meeting the 2025 goal.

More than 80 percent of the Maryland urban stormwater nitrogen and phosphorus load is under the authority of permits (Phase I, II, construction). The state has issued National Pollutant Discharge Elimination System Municipal and Separate Storm Sewer System (MS4) Permits for the regulated Phase I jurisdictions and Maryland Department of Transportation's State Highway Administration. These permits require nutrient reductions associated with 20 percent impervious area restoration over the current five-year permit cycle. Policies are also being explored by Maryland's Water Quality Trading Advisory Committee that would allow the purchase of lower-cost nutrient reduction credits by the stormwater sector, which would accelerate nutrient reductions to the Bay. Recognizing the need for a consistent and efficient restoration project permit review process, Maryland Department of the Environment is committing additional staff resources for the review; working with the U.S. Army Corps of Engineers on ways to condense processing times; and is developing better guidance for the assessment of stream and wetland systems to better evaluate existing conditions and predict ecological uplift.

Senate Bill 863, passed in the 2015 General Assembly and signed into law by the governor, repealed the mandate on jurisdictions to impose a stormwater remediation fee, however, did allow for one to be imposed by the jurisdictions. The Bill also required jurisdictions to hold a public meeting on their financial assurance plan and to submit them to Maryland Department of the Environment for review and approval. Based on the financial assurance plans, the Department is confident that the financial resources are sufficient to ensure an appropriate pace of progress that is consistent with Maryland's Chesapeake Bay implementation planning framework.

On-Site Septic Systems: The septic sector contributes about 6 percent of Maryland's nitrogen load to the Bay. The state is taking a measured step for a smarter and more effective septics program across the state. Three R's: (1) Reforming BAT septics regulations, (2) Re-tooling inspection and enforcement to place emphasis on failing systems, and (3) Re-thinking septics vs sewer decisions to help connect to sewage treatment plants, is one part of a broader effort to meet clean water goals in the most effective, efficient and equitable ways. The state continues to fund the upgrade of systems to the use of Best Available Technology (BAT), which are targeted to failing systems and systems in the Critical Area and address about 1,200 systems per year. Although regulations affecting new development will no longer require BAT everywhere, they will still be required in critical areas. Through recent changes in the eligible uses of the Bay Restoration Fund, there may be greater opportunity to use these funds to connect more areas of septic systems in the critical area to advanced wastewater treatment plants. These strategies in total will not meet the septic reductions specified in the Watershed Implementation Plan by 2025, but the state projects that the gap could be closed by

temporarily using surplus wastewater sector load reductions similar to stormwater. Because septic upgrades are very expensive per pound, the state is currently evaluating market based approaches for reducing the cost in meeting the sector target.

Clean Air Act Role: Atmospheric deposition is a major nitrogen source in the urban environment. Air pollution reduction strategies brought about by the Clean Air Act have region-wide water quality benefits and are a key driver of nitrogen reduction. Actions implemented from 2010 to 2020 through the Clean Air Act are expected to result in 6.5 million pounds of nitrogen reduction in the Bay. This represents 10% of the reduction needed under the Bay TMDL, across all jurisdictions. This reduction is already accounted for in the Bay TMDL jurisdiction allocations. Any additional nitrogen reductions realized through more stringent air pollution controls can be credited. We will realize our next significant atmospheric deposition reduction beginning in 2017 with the Tier III emission standards for light-duty vehicles. These tighter emission standards will affect all new light-duty vehicles sold beginning with the 2017 model year. Per Tier III regulations, the new emission standards combined with the reduction of gasoline sulfur content will significantly reduce motor vehicle emissions, including NOx. This will result in additional reductions in atmospheric deposition of nitrogen to the Chesapeake Bay watershed.

Maryland has recently filed a Clean Air Act Section 126 petition with federal regulators to require power plants in five upwind states to reduce pollution that significantly affects the quality of the air that Marylanders breathe. If successful, this action will have health benefits and result in additional nitrogen reductions to the Bay.

Conowingo Dam: The state recognizes the ongoing risks and uncertainties surrounding sediments and nutrients building up behind the dams on the lower Susquehanna River. Continued analysis of impacts on the Bay and equities among the parties and jurisdictions involved will be important factors as the state considers revisions to the Bay Model, state Watershed Implementation Plans, and Clean Water Act Section 401 Water Quality Certification as part of the Federal Energy Regulatory Commission dam relicensing process. Maryland realizes that there is no one solution to address the impacts from the Conowingo Dam reaching full capacity. It will take a multi-pronged approach that includes upstream solutions.

On July 7, 2016 Governor Hogan held a Conowingo Dam Summit, announced a Request for Information (RFI), and established a Conowingo Dam Sediment Management Working Group. The purpose of the Working Group is to develop and conduct the RFI which will be used to identify cost-effective dredging solutions, including beneficial and/or innovative uses, for mitigating the increase in sediments and associated nutrients being delivered to the Chesapeake Bay now that the Conowingo Dam has reached full sediment storage capacity. The RFI was advertised on August 1, 2016 and mailed to about 750 firms. The working group; consisting of state, federal and private representatives; is evaluating the responses to

determine if there are viable, cost effective solutions that can be used to develop a Request for Proposals.

The Chesapeake Bay Total Maximum Daily Load 2017 Midpoint Assessment is closely linked with Maryland's Water Quality Certification, both in data collection and expected relicensing timing. The Exelon funded enhanced monitoring and modeling is currently being included in the development of the EPA Chesapeake Bay Partnership Computer models. These models will be used to support the 2017 midpoint assessment, including setting state-basin targets for the Phase III watershed implementation plans, and quantifying the impact of the sediment Conowingo infill on Bay water quality. Over the winter of 2016 and early 2017, these modeling tools will be going through significant review with the Chesapeake Bay Program Scientific and Technical Advisory Committee.

II. Report from the University of Maryland Environmental Finance Center

A 2015 assessment by the University of Maryland Environmental Finance Center on a) Bay restoration progress to date, b) necessary future progress to meet the 2025 goals, and c) available resources, concluded that, "Our analysis indicates that the resources are in place to achieve interim and final restoration targets. In other words, no new state-based fees or taxes are required moving forward."[2] (Maryland's Chesapeake Bay Restoration Financing Strategy Report, University of Maryland Environmental Finance Center, February 2015).

The report also surmised that success will be primarily the result of the state's aggressive efforts to finance advanced wastewater treatment, which enabled reductions in that sector to go beyond those required in the Total Maximum Daily Load and the Watershed Implementation Plan. In addition, the report placed emphasis on the State's need to have procedures for tracking future net increases in loads and ensuring they are offset by appropriate reductions.

The Environmental Finance Center's conclusion, however, is based on three important caveats, each of which is associated with significant policy implications as the state moves forward:

> **EFC Report Caveat #1**: The state applies its expected excess wastewater treatment plant allocation (i.e. urban growth capacity) today to offset expected shortfalls in the stormwater and septic sectors and then builds the capacity for growth back into the system.
>
> Given the socioeconomic also technical challenges with reducing nutrients attributed to stormwater and septic, implementation in these sectors is projected to extend beyond

[2] The EFC study considered only a broad analysis of capital needs. This finding does not consider operational needs, such as the resources necessary to verify the long-term inspection and maintenance of various pollution control practices, which if not done could result in the loss of credit for practices implemented in the past.

2025. As a result, the only apparent way to meet Maryland's 2025 target is to temporarily loan some of the unused future wastewater treatment plant capacity to the stormwater and septic system sectors, unless as-yet unknown alternative pollution control practices can be identified. If allocations are loaned from wastewater to stormwater/septic, then assurances, with contingencies, must be established to ensure wastewater capacity is restored when needed. Otherwise, economic growth within our cities, towns and other communities on sewer systems would be inhibited, thereby encouraging development of farmland and forest land, which the state is trying to preserve. It would also hurt the financial condition of local governments that have paid for wastewater treatment plant growth capacity. The specifics of implementing the concept of loaning, and eventually repaying, wastewater treatment plant growth allocations have not yet been determined, and impacts to growth patterns and local government finances could still occur if not managed carefully. Ideas for ensuring wastewater treatment plant growth allocation loans are repaid in a timely way include: continued implementation of nutrient reductions through the MS4 permits after 2025; using some of the BRF to purchase low-cost alternative reductions on behalf of the septic system sector, pursuing public-private partnership arrangements and other market-based approaches to prompt more participants to enter Maryland's growing environmental restoration economy, adopting new verifiable control technologies and ensuring reductions are being credited for pollution activities that traditionally have not been accounted for. Other financing ideas are presented in Part IV of this report.

EFC Report Caveat #2: Assume that the current level of regulation will be maintained within each of the four pollution sectors and that enforcement will be consistent and effective.

There are two options available to the state for addressing pollution load reductions: assigning responsibility through regulation or directly financing reductions. If permit requirements are not upheld, then it will be the state's responsibility to finance those associated pollution reductions, which would in turn require additional revenue sources. This ultimately means that permitted entities are held responsible for financing and meeting their permit requirements.

Traditionally, a private entity that receives a permit is held responsible not only for meeting the permit requirements, but for covering the financial costs necessary to do so. The state is within reach of achieving its 2025 Total Maximum Daily Load requirements with current funding levels, but only if it is assumed that permitted entities cover the costs of meeting their permit requirements and the state funding is used to address non-permitted cost effective restoration responsibilities.

EFC Report Caveat #3: Current state Chesapeake Bay grant programs are fully funded and applied in the most cost effective manners possible.

Maryland has taken the bold steps necessary through creation of the Bay Restoration Fund and the Chesapeake and Atlantic Coastal Bays Trust Fund to ensure two dedicated and significant fund sources to assist in meeting the state's 2025 Total Maximum Daily Load requirements. At their current funding levels, these two fund sources, are expected to collectively generate approximately $1 billion by 2025. The Environmental Finance Center report estimates that the total cost to achieve the remainder of our 2025 Total Maximum Daily Load requirements is approximately $5.1 billion. However, if the state temporarily loans the excess wastewater treatment plant allocation to address an expected shortfall (Caveat #1) and holds permit holders (including MS4 jurisdictions) responsible for the costs of meeting their permit requirements (Caveat #2), then the $1 billion generated through a fully funded Bay Restoration Fund and Chesapeake and Atlantic Coastal Bays Trust Fund is estimated to be sufficient to cover the remainder of the gap to 2025 if the funds in these two programs continue to be applied in ever more most cost effective ways possible. This means that funds in these programs must be applied in scientifically guided approaches that realize the greatest pounds of nutrient or sediment reductions per state dollar spent. Inherent in this is the critical need for the state to maintain its Bay restoration effort grounded in sound monitoring, assessment and science. It is essential to not only track progress in a technically robust manner, but to continually evaluate and apply the latest scientific guidance in Bay restoration.

Implementing this approach will mean changing the state's current process for allocating these funds – including eliminating set-asides for less cost effective Bay restoration practices and adhering to predetermined pollution sector allocations. Paying for the largest number of pounds of nutrient/sediment reduction per state dollar must be the driving force in allocating these funds.

III. Maryland's Bay Restoration Framework

The Environmental Finance Center's conclusion that Maryland has the resources to achieve its 2025 Total Maximum Daily Load requirements is encouraging and the Chesapeake Bay Cabinet recognizes the economic, social and policy challenges associated with the caveats above. To address these challenges and meet the Environmental Finance Center conditions, the cabinet is working through a list of key elements or approaches which can be found at the conclusion of this section.

A key message from the Center is that projected total nitrogen and phosphorus reductions in Maryland are on track to achieve the 2017 interim goal and the 2025 final targets are within reach, even with septics and stormwater anticipated to reach their ultimate targets after 2025. Current estimates by the Environmental Finance Center indicate that meeting the targets will require full funding of existing Chesapeake Bay grant programs. Maryland's successful effort to achieve reduction targets will also largely be the result of aggressive implementation efforts

and collaboration within the agricultural, point source wastewater management and urban stormwater sectors.

When looking toward 2025 and accounting for loads from the four key pollution sectors collectively (agriculture, point source wastewater, urban stormwater and onsite wastewater or septic), the state will reduce more than 10 million pounds of nitrogen and 0.49 million pounds of phosphorus. A note of caution is that there is no margin for backsliding in approaching 2025. This means that any changes that increase our current nutrient loads, decrease in implementation of annual and new nutrient reduction practices, or failure of permitted entities (ex. MS4 jurisdictions) from meeting their required implementation and schedule, will prevent us from meeting our 2025 reduction targets.

Accordingly, the following six elements of Maryland's Bay Restoration Framework will be used to address the Environmental Finance Center caveats and guide the state's strategies moving forward:

1. ***Use wastewater treatment plant growth allocations wisely to preserve future options for local growth and identify solutions to build capacity back into the system***: Although the stormwater and septic system sectors are projected to fall short of their 2025 nutrient loading targets, the municipal wastewater sector is projected to be further ahead of its target with capacity to grow. This provides an opportunity to cover the shortfall in the stormwater and septic sectors with the surplus in the wastewater sector temporarily. If the wastewater surplus is effectively loaned to cover the shortfall, the state would need to establish mechanisms to ensure future wastewater growth capacity is available when needed after 2025. This suggests that continued reductions from stormwater and septic systems will be necessary after 2025. To ensure success, we will need a full toolbox including grants, low interest loans, trading, public-private partnerships, and permit flexibility that allows for innovation. This also implies that the state must mitigate new growth in loads, which could necessitate regulatory action.

2. ***Mitigate the future impact of growth in pollutant loads:*** Although the state has some policies and procedures to account for and offset new pollutant loads, they need refining. Consequently, future state and local governments are at risk of paying for the mitigation of new pollution generated by the private sector in the future. To address this risk, the state must establish a means of acquiring information to properly account for changes in pollution loads and should continue to invest in land protection efforts that focus on minimizing pollution and maintaining pollution reductions over time. The state must also develop policies for managing the distribution of nutrient allocations among sources over time in a transparent way. As a result, the pollution impacts of any growth in pollution loads must be mitigated to successfully maintain the pollution cap. We believe that there are opportunities for market systems to dramatically reduce the

costs of future mitigation efforts, but regardless of the system that is employed, it is essential to mitigate the impacts of growth into the future.

3. ***Focus on pollution reduction targets and transition to a credit based financing and accounting system:*** The state is in a position to establish a credit based financing and accounting system that would serve as the foundation for water quality investments into the future. This also means that regardless of the policies, processes and regulations that the state advances moving forward, achieving and maintaining final pollution targets must remain the primary goal, and those targets must be enforced and maintained through required caps. Restoration success is possible and a more efficient, market-based approach to financing will reduce costs and accelerate implementation, ultimately resulting in a restored Chesapeake Bay in the long-term. However, a restoration economy will not materialize if investors cannot rely on the government's adherence to meeting environmental goals in a reasonably certain timeframe. In short, achieving restoration success efficiently and cost-effectively requires a commitment to implementation and investment, and it is an investment that we believe will pay significant dividends to the citizens of Maryland and the rest of the watershed.

4. ***Reaffirm that restoration responsibility starts and ends with the states:*** The U.S. Environmental Protection Agency delegates responsibility to the states to implement key provisions of the federal Clean Water Act, which includes establishing the Bay Total Maximum Daily Load allocations and Watershed Implementation Plans. Although the plans assign responsibility for load reductions across the public and private sectors, it is ultimately the Bay states that are being held accountable for achieving restoration goals. Maryland has a combination of options to advance the implementation process. According to the Environmental Finance Center report, the state can drive reductions by regulating pollution emissions and/or reductions. It then becomes the primary responsibility of the regulated entity to find ways of financing the necessary pollution reduction activities. The state can also assume some responsibility for financing required pollution reductions if it is not possible or desirable to compel reductions through regulation. The state also has the opportunity to fully embrace nutrient pollution trading and innovative public-private partnerships to advance successful implementation.

5. ***Complete a strategy to address the estimated $5.1 billion cost to implement remaining nutrient and sediment reductions:*** Given that restoration success will require achieving stipulated pollution reductions, accomplishing the reductions goals will come with costs. Based on an analysis of each of the four primary pollution sectors, the University of Maryland Environmental Finance Center estimated that the remaining cost for reducing existing sources of pollution to the 2025 targets will be approximately $5.1 billion at an average cost of $66 per treated pound of nitrogen. Point source wastewater costs included debt financing only. Urban stormwater includes an estimate for MS4 permit

compliance up to 2025, including the Maryland Department of Transportation's State Highway Administration. Spending on septic upgrades is assumed to be level. Both stormwater and septic systems are assumed to fall short of their 2025 targets. Wastewater treatment plant allocations are assumed to be temporarily loaned to cover shortfalls in stormwater and septic sectors in 2025.

The majority of these costs, approximately 65 percent or $3.3 billion, are associated with meeting urban stormwater management permit obligations by the ten Phase I MS4 jurisdictions and the Maryland Department of Transportation's State Highway Administration. This state agency has an estimated implementation cost to the state of approximately $690 million, which will be funded through the Transportation Trust Fund. The remaining $2.7 billion is the responsibility of the other ten permitted local jurisdictions. At the time that the Environmental Finance Center report was drafted, stormwater fees in those ten jurisdictions were estimated to generate about $1.2 billion over the next ten years. However, pending nutrient trading policies are intended to lower the costs and help accelerate the stormwater sector's contributions toward meeting Maryland's nutrient reduction goals. Financial assurance plans recently developed by those jurisdictions indicate the ten permitted jurisdictions meet their funding obligations for the near term. Future periodic financial assurance plans will provide a way to ensure resources are sufficient to meet future permit obligations.

The remainder of these costs – approximately 34 percent or $1.8 billion – are to reduce nutrients and sediment through current state funded programs that both maintain existing annual practices (ex cover crops) and implement new practices in the wastewater, agriculture, stormwater, and septic sectors. These are primarily funded currently through the Bay Restoration Fund and the Chesapeake and Atlantic Coastal Bays Trust Fund. Those two funds are estimated to generate almost an additional $1 billion by 2025. Assuming that the Bay Restoration Fund and Chesapeake and Atlantic Coastal Bays Trust Fund appropriations are continued as their current allowances (approximately $100 million annually combined), then any remaining funding gaps can be addressed through the strategies like those discussed in Part IV including the following:

- Continued leveraging of the annual allocation to provide additional financing – this is existing practice, particularly through 2010 Trust Fund grants.
- Permitted Phase I MS4 local jurisdictions meet and fund their permitted requirements.
- The state funds the estimated $690 million for Maryland Department of Transportation's State Highway Administration to meet its permitted MS4 requirements through the Transportation Trust Fund
- Issuing bonds against the Bay Restoration Fund revenue stream.

- The state targets as much as possible existing state Chesapeake Bay grant program restoration fund sources to the most cost effective practices.
- Continuing to develop new technologies, industries, and implementation processes that allow current funding to realize greater results.
- The state temporarily loans some or all of the excess wastewater treatment plant capacity with the commitment to repay afterward to accommodate continued growth.
- Take a leadership role in acting on the Chesapeake Bay Executive Committee's *2016 Resolution to Support Local Engagement* that directs the Principal's Staff Committee to "evaluate and pursue opportunities to increase public funding and private investment for local implementation of conservation and restoration activities that achieve local healthy streams, rivers and a vibrant Chesapeake Bay, particularly activities that reduce pollutants from stormwater runoff and address the problem of recurrent flooding."

6. ***Recognize that success doesn't end in 2025:*** It is important to stress that the ultimate financing and restoration goal is not solely to achieve the 2025 pollution reduction requirements, but to also maintain those reductions over time. In addition to the costs of reducing existing sources of pollution, there will be costs to mitigate the impacts of pollution growth. Ideally those costs should be borne by the private sector, unless the public sector chooses to subsidize the costs as is the case with the upgrading of municipal wastewater plants via the Bay Restoration Fund. This framework will require state and local governments to effectively balance the need for aggressive pollution reduction activities with equally aggressive long-term protection strategies, which will in turn require the state to evaluate and implement long-term cost effective strategies to accelerate restoration while reducing the cost of implementation.

Next Steps: Maryland's framework for achieving the Chesapeake Bay nutrient and sediment reduction targets by 2025 recognizes the need to preserve and use existing state revenues in the most cost-effective way. In addition to targeting cost-effective pollution controls, this can include leveraging other funding sources, using market-based mechanisms and fostering a restoration economy. The state needs to be a prudent and smart steward of the environment as well as taxpayer dollars.

The framework also recognizes that progress among pollution source sectors is uneven over time. Expected shortfalls in some urban sectors might need to be covered by anticipated surpluses in the wastewater sector on a temporary basis. However, given the vital importance of ensuring long-term wastewater treatment plant capacity, the state must maintain and develop tools to ensure efficient and effective reductions leading up to and continuing after 2025. In addition to traditional tools, this will likely include innovative financing, transparent public-private partnerships and market-based approaches that drive costs down and promote innovative technologies. This framework is premised on technical analyses that use the

Chesapeake Bay Program's suite of modeling tools. These tools are currently being refined as part of a midpoint assessment process that will conclude in 2017 with a revised set of models. The refined models could change pollution estimates used to develop this framework. This represents a current uncertainty that could necessitate adjusting the framework.

In April 2017, the Chesapeake Bay Program will provide states with their final expectations for developing Phase III Watershed Implementation Plans. The plans will lay out the each jurisdictions' path for achieving their 2025 targets. The plans are to be completed by the end of calendar year 2018. The framework reflected in this document can be viewed as a step towards the development of Maryland's Phase III Watershed Implementation Plan.

Part IV: Implementing a Sustainable Chesapeake Bay Restoration Financing Strategy

For the past 30 years, significant resources have been committed to studying threats to the Bay and its watersheds, identifying restoration opportunities, and assigning restoration responsibilities. Though the Watershed Implementation Plan provides state leaders with a roadmap for restoring and protecting the Chesapeake Bay and its watershed lands, the associated costs could be a barrier to success. Overcoming this barrier will require local, state and federal leaders to look beyond traditional funding programs and tools and to develop effective, sustainable, market-based financing strategies. This section, 1) highlights recent Maryland Bay financing actions, 2) identifies future actions under consideration toward implementing a sustainable Bay restoration financing strategy and 3) summarizes the findings from the April 2016 Chesapeake Bay Environmental Finance Symposium.

I. Summary of Recent Maryland Financing Actions Currently in Process: While Maryland was an active participant in the Environmental Finance Symposium, and looks forward to continued discussions with the Environmental Finance Center and our Chesapeake Bay Program partners on how to further the recommendations of the symposium throughout the Bay watershed, Maryland has and continues to move forward on its own. For example, Maryland has long allowed local governments to use the Water Quality Revolving Loan Fund to access capital in lieu of issuing local debt. The Water Quality Revolving Loan Fund current loan interest rates (including fees) range from 0.95 percent/yr fixed rate for disadvantaged communities and 1.55 percent/yr for all others, for a term up to 30-years. This can provide substantial debt service savings when compared to issuing local debt around 4 percent/yr. Local governments can also leverage their storm water fee revenue by issuing long term debt rather than undertaking only pay-as-you-go stormwater capital improvements. Maryland continues to explore and implement new financing actions to maximize the impact of our Bay Restoration funding. Following are a listing of significant recent Maryland Bay financing actions:

Bay Restoration Fund: This fund continues to be a pollution reduction driver. Since its inception in 2005 through Fiscal Year 2016, the fund has awarded $1.19 billion in grants for enhanced nutrient reduction at the 67 major wastewater treatment plants. With the major wastewater treatments plants fully funded, the fund will continue its emphasis on cost efficient nitrogen reductions to achieve Bay restoration goals.

- *Increase emphasis on cost efficiency through Revised Integrated Project Priority System.* The system consists of four rating categories which include: Water Quality or Public Health Benefits; Compliance; Cost Efficiency; and Sustainability. Total scoring points are being increased in “cost efficiency” to ensure that grant funded projects are providing the highest environmental benefits for the least

dollars spent. The most points are still awarded to either the project's nitrogen reduction benefit or public health benefit. The revised scoring system is likely to result in higher scores for projects that have a high nitrogen reduction or significant public health benefits and are also cost effective at reducing nitrogen, one of the major nutrients polluting the Bay.

- *Pay directly for nutrient reductions*. During the 2016 session, legislation (House Bill 325) was proposed that would allow a portion of the Bay Restoration Fund to purchase cost-effective nitrogen and phosphorus credits (reductions) from Maryland's nutrient trading market. The outcome of this revision is expected to energize Maryland's largely inactive nutrient trading market while also providing the State with another mechanism to more cost effectively meet Bay restoration goals. MDE withdrew the legislation in 2016 to work with stakeholders and address concerns. Through open discussions and input from Maryland's Water Quality Trading Advisory Committee the proposed legislation has been revised and will be reintroduced during the 2017 session.

Chesapeake and Atlantic Coastal Bays Trust Fund: For the first time since its inception, the Trust Fund was fully funded in Fiscal Year 2016. Between 2009 and 2015, the fund has invested more than $250 million in efforts to improve the health of the Chesapeake Bay by advancing the implementation of local and state Watershed Implementation Plans. Its singular focus on reducing non-point sources of nutrient and sediment pollution makes it one of the only programs of its kind in the nation. In Fiscal Year 2016 the fund targeted $39.4 million and leveraged an additional $17.8 million in local and private funding to accelerate state and local efforts to improve the health of the Chesapeake Bay. As a transformative step forward, the fund's annual solicitation for projects began directly linking investments to water quality performance rather than implementation rates. By establishing pounds reduced per dollar spent as the primary criterion for selecting projects, the fund built an inherent incentive into the financing system to improve efficiency. To continue to build on the Trust Fund's innovative structure to expand its reach and influence, it is essential that the Trust Fund be catalytic in nature, facilitating the flow of public and private capital and improving the effectiveness of other restoration policies and programs across the state. There are several market-based financing pilots initiated through the Trust Fund.

- *Cost-efficiency through project aggregation and cooperatives:* New partnerships implemented by Soil Conservation Districts in Harford, Baltimore, Frederick and Howard County who have entered into a public/private partnership to assist in the design, permitting and implementation of wetland, stream and habitat restoration projects. Through this partnership, private companies function as an

aggregator to help identify and secure potential land opportunities and additional funding for targeted restoration.

- *Pay for Success through private investment:* Initiated a pay for success model. Private investment firms in the watershed are combining private equity fund management with ecosystem restoration expertise to realize desired environmental returns in a cost-effective, large-scale manner. In these models, no portion of the state investment is paid until the construction is complete and is determined by proposed outcomes of nutrient and sediment reduction in the tributary. This payment mechanism greatly reduces the risk of investment for public dollars compared to standard restoration grant-making.

- *Advancing restoration science with private partners:* Leveraging technical knowledge and restoration expertise of private entities to further advance restoration practices, provide enhanced scientific data and interpret results to inform future public and private investments. Private partners are coordinating outreach to landowners in priority areas and working with a team of federal, state, and local partners to develop incentive programs, implement conservation practices and design appropriate research and monitoring programs.

- *'Turnkey' Restoration with Private partners:* Private companies in the business of ecological restoration have identified landowners with potential opportunities to restore ecological function to the landscape and produce credits and offsets. The 'turnkey' approach by the private firm assures the landowner that all aspects of the project will be fully realized (financial and ecological) for a fixed price, and all credits generated will benefit the local jurisdiction's water quality goals. State investments are scheduled based on project milestones, from easement coordination through as-built completion and year one of maintenance.

Water Quality Trading: Maryland released its Nutrient Trading Policy statement in October 2015, detailing a roadmap for the development of a cross-sector, market-based trading program that allows innovation, economies of scale, and public/private partnerships to accelerate the restoration of the Chesapeake Bay and local rivers and streams. Maryland anticipates having a trading program structured and operational in 2018. Since the October 2015 announcement, the Maryland Departments of Agriculture and the Environment have:

- Conducted a nutrient trading symposium. In January 2016, a symposium was held discussing concepts of trading and the role of trading in Bay restoration efforts, as well as the State's current approach to trading and its future plans. The symposium was conducted in collaboration with the Harry R. Hughes Center

for Agro-Ecology, the Chesapeake Bay Foundation, and the Maryland Grain Producers Association.

- Established a Water Quality Trading Advisory Committee. The 32-member committee, representing a diverse group of stakeholders from across the State, was created to provide direction to the overall trading program and oversee any further development of the trading infrastructure.
- Developed a Draft Water Quality Trading Manual. The new Advisory Committee has held a series of meetings to review and refine the Draft Water Quality Trading Manual released in January. The draft manual consolidates policies and guidelines issued in 2008 by the Departments of the Environment and Agriculture. More specifically, it adds flexibility and additional options for regulated local governments and state and federal agencies with Municipal Separate Storm Sewer Systems permits to engage in trading once the necessary regulatory or permitting frameworks have been established. The trading manual is expected to be finalized by the end of the year.

Phase I MS4 Financial Assurance Plan requirements/review and implementation plans: In May 2015, revisions to Maryland's stormwater management law, passed by the General Assembly and signed into law by Governor Larry Hogan, did away with mandatory stormwater remediation fees. These revisions resulted in new fiscal reporting requirements for Maryland's Phase I MS4 jurisdictions, which include Baltimore City and Anne Arundel, Baltimore, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's Counties. One of the new reporting requirements, financial assurance plans (FAPs), needed to demonstrate how impervious surface restoration plans (ISRP) are going to be paid for during the permit term. Each jurisdiction submitted comprehensive information on local stormwater management projects, costs, and budgets for meeting ISRP requirements, including:

- Annual Programs: street sweeping, inlet cleaning, storm drain vacuuming
- Structural Practices: wet ponds, swales, infiltration, dry wells, rain gardens, green roofs, permeable pavement, rainwater harvesting, submerged gravel wetlands
- Alternative Practices: tree planting, outfall stabilization, stream restoration

All MS4s locally certified that they have sufficient budgets to fund at least 75% of the ISRP requirements for FY2017 and FY2018, meeting the stormwater law's fiscal criteria. All told, the MS4 jurisdictions have projected spending $552.9 M over the next two fiscal years and $1.19 B over the course of the five-year permit term.

The Maryland Agricultural Water Quality Cost-Share (MACS) Program: Since 1985, the MACS Program has provided publicly supported grant funds to assist tenant farmers and farm owners with the implementation costs of Best Management Practices (BMPs) to control water quality problems on their property. Projects receiving cost-share from state funds are authorized by the State Water Quality Loan Act and must be approved by the State Board of Public Works. Costs for installing BMPs vary depending on the area being protected, the scope of the problem, and local construction costs. BMP cost-share is up to 87.5 percent of eligible project costs. The amount of grant support provided also depends on the cost-effectiveness of the proposed BMP when compared to other alternatives for that site or cap related to sediment control or manure managed. Between 1998 and 2015, the Program has awarded over $76 million in state funded grants to address water quality concerns on agricultural land in Maryland.

Transportation-Infrastructure Restoration Partnership: Maryland Departments of Natural Resources, Environment, and Transportation are exploring opportunities to target and undertake high-quality restoration projects on state lands that satisfy Total Maximum Daily Load and MS4 requirements. The goal of this partnership will be to provide solutions to the high cost and limited options the Department of Transportation faces with meeting current and future stormwater, and Total Maximum Daily Load requirements; ensuring the optimum use of public funds and; improve the use, safety and habitat of the state's public lands.

II. Summary of 2017 Financing Plans: With the above actions underway, Maryland's Chesapeake Bay Cabinet is continuing to improve and explore new opportunities to ensure that Maryland's Bay Restoration funds are used in the most cost effective means possible. The following are additional Maryland-specific financing actions that the cabinet will be working on in 2017:

A. Continue to Explore and Evaluate Public-Private-Partnerships: If the local government does not have the staff resources, or does not want the capital debt on its balance sheet, the above option can be undertaken through a private entity that can raise the capital funds, undertake the stormwater capital improvements, operate and maintain the Best Management Practice to ensure nutrient reduction, while the public entity makes the annual fee payment to the private entity.

B. Make Bay Restoration Fund Grants available to local governments for cost-effective nutrient reduction: Under the current Bay Restoration Fund statute, starting in Fiscal Year 2018, in addition to wastewater treatment plant upgrades for enhanced nutrient removal, the local governments are eligible for state grants to partially offset the capital cost of septic to sewer connections, existing sewer rehabilitation and stormwater Best Management Practices. Maryland Department of the Environment is updating its

project priority rating system to provide greater weight to cost-effectiveness for nutrient reduction.

C. Establish Credit-Based Financing System in Bay Restoration programs: Similar to the Bay Restoration Fund nutrient credit purchase legislation in 2016, explore other opportunities to use restoration funding (federal, state, local) to purchase credits, resulting in gains in overall cost efficiency. By structuring restoration transactions in terms of reduction credits, the marketplace will have a consistent protocol for evaluating each proposed restoration project (i.e. in terms of how many credits it generates) and the state will have a clear metric by which restoration progress can be measured. This supports enhanced transparency in how state and local governments finance restoration activity and it will require project implementers in the private sector to be more transparent in accounting for performance, which ultimately improves the efficiency ratio and results in greater conservation per dollar spent.

D. Increase Collaboration with Environmental Finance Experts: To maintain the momentum generated by the Environmental Finance Symposium and move forward with appropriate changes, it will be critical for the Bay Cabinet to work with outside finance and policy experts to identify innovative and implementable solutions. Solutions should be focused on cost savings, increased efficiencies and connecting Bay restoration with economic development.

E. Closely Coordinate with Chesapeake Bay Program Financing Opportunities: The Chesapeake Bay Program is currently reviewing and evaluating the recommendations of the 2016 Environmental Finance Symposium. Maryland is currently, and will remain, actively involved in those discussions and implementation of appropriate actions.

III. Summary of the Environmental Finance Symposium:

As a result of Maryland's leadership in promoting an increased emphasis on Environmental Financing, on April 25-26, 2016, the University of Maryland Environmental Finance Center, in collaboration with the Chesapeake Bay Program, convened the Chesapeake Bay Environmental Finance Symposium. This event was designed to identify innovative approaches for leveraging or incentivizing private investment in Bay restoration and protection efforts. The event gathered more than 130 leaders from diverse fields including finance, business, policy, and resource protection to discuss options for advancing a more market-like approach to achieving Bay restoration goals. Following is a summary of the major recommendations that were identified during the two day symposium.

In addition to the five "Core" and four "Theme-Specific" recommendations listed below, the symposium also recommended, as an immediate next step, to create a Financing Advisory Board to work in partnership and coordination with the Chesapeake Bay Program as a way to

maintain the momentum generated and move toward actual change. The proposed Financing Advisory Board would be populated by finance, economic, and policy experts and address key financing issues impacting the Bay jurisdictions. The recommendations that follow suggest tasks and implementation steps that would be appropriate for this new board to provide advice to the Partnership.

EFC Symposium Core Recommendations:

1. Strengthen the linkage between the Bay restoration effort and the region's economy and economic development framework. Three opportunities are identified: develop industries and products that are naturally linked with a clean and healthy Bay; target investment in BMPs that also support the local and regional economy; and local and state governments can create incentives to grow innovative initiatives that both generate revenue and function as restoration practices in and of themselves.

   EFC Symposium Suggested Task: Invite the appropriate commerce and business development agencies within the Bay watershed states to be part of the Chesapeake Bay Program's management and decision making systems.

2. Establish a credit-based financing system in order to explicitly tie water quality restoration investments with the desired outcome of reduced nutrient and sediment loading to the Bay. Hand-in-hand with adopting a credit-based financing system is a shift toward a performance-financing approach, which focuses on the desired outcome rather than the means to get there. To enable water quality trading and other Bay-wide restoration investments, it will be necessary for local and state leaders to create water quality market infrastructure.

   EFC Symposium Suggested Task: Transition Bay restoration funding to credit-based financing.

3. Performance standards for a stormwater or water quality market can be modeled on those in the mitigation banking system, which address three main areas: legal standards; financial standards; and biological or physical standards.

   EFC Symposium Suggested Task**:** Proposed Finance Advisory Board should work with the National Network on Water Quality Trading Alliance and the National Water Quality Network to develop performance standards for a water quality restoration market.

4. Consider implementation of two main process changes that could significantly improve private sector engagement and reduce transaction costs: 1) streamlining permitting processes, and 2) transforming local and state procurement systems.

   EFC Symposium Suggested Task: Bay jurisdictions engage stakeholders to identify/resolve inefficiencies in permitting and procurement

5. Bay jurisdictions should make sure that state and local investments to restore the Bay through non-point pollution reduction projects are funded only when viable projects are ready, and that they have the institutional structure that have the capacity to hold funds through multiple fiscal years. For example, the ability to hold or bank revenue without concern that funding will be sequestered or reallocated; leverage and receive revenue; and, purchase, hold, and distribute water quality credits as needed.

   EFC Symposium Suggested Task: State revolving funds assess their capacity to invest in non-point pollution reduction, and reform the programs, as necessary.

EFC Symposium Theme -Specific Recommendations: In addition to core recommendations, the symposium also identified four specific themes to accelerate the implementation of enabling conditions at the state and local levels.

1. *Pilot pay for success investment model:* A social impact bond, also known as a pay for success contract, is an agreement between a public agency and a private firm, in which a commitment is made to pay for improved social outcomes that result in public sector savings.

2. *Establish proactive stormwater banking program:* In a stormwater banking system, property owners construct BMPs capable of treating more stormwater than is required by their own permit, thereby generating credits that can be sold to others who need to meet their own stormwater management requirements, such as developers seeking a lower-cost alternative to managing stormwater onsite.

3. *Advance public-private partnerships, where appropriate:* Establish a contractual arrangement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public.

4. *Incentivize commercial landowners to mitigate nutrient and sediment emission:* This recommendation differs from the others in that enabling depreciation for water quality practices will require federal authorization and legislation. States can create conservation tax credit programs independent of the federal government; however, the most effective program would include federal income tax relief.

Appendix 1: Chesapeake Bay Restoration Activities Funded in the Budget

Total Funds	
	FY 2016 Actual
Department of Natural Resources	91,942,592
Program Open Space	24,210,428
Rural Legacy	10,082,149
Department of Planning	5,439,791
Department of Agriculture	44,036,219
Maryland Agricultural Land Preservation Foundation	24,726,722
Maryland Department of the Environment	289,341,394
Maryland State Dept of Education	416,945
Maryland Higher Education	19,916,834
Maryland Department of Transportation	225,126,909
Total	**735,239,984**

General Funds	
	FY 2016 Actual
Department of Natural Resources	7,162,800
Department of Planning	4,435,637
Department of Agriculture	10,482,010
Maryland Department of the Environment	26,278,520
Maryland State Dept of Education	416,945
Total	**48,775,912**

Special Funds	
	FY 2016 Actual
Department of Natural Resources	61,730,088
Program Open Space	700,000
Rural Legacy	711,649
Department of Agriculture	11,686,835
Maryland Agricultural Land Preservation Fund	5,249,699
Maryland Department of the Environment	187,906,200
Department of Planning	0
Total	**267,984,471**

Federal Funds	
	FY 2016 Actual
Department of Natural Resources	10,834,338
Program Open Space	1,907,678
Department of Planning	140,184
Department of Agriculture	669,302
Maryland Agricultural Land Preservation Fund	0
Maryland Department of the Environment	41,322,395
Total	**54,873,897**

Reimbursable Funds	
	FY 2016 Actual
Department of Natural Resources	4,615,367
Department of Agriculture	19,198,072
Maryland Department of the Environment	552,279
Department of Planning	863,970
Total	**25,229,688**

Higher Ed	
	FY 2016 Actual
Current Unrestricted	11,729,446
Current Restricted	8,187,388
Total	**19,916,834**

GO Bonds	
	FY 2016 Actual
Maryland Water Quality Revolving Loan Fund	6,782,000
WQFA CAPITAL PROJECTS	0
Biological Nutrient Removal Program	26,500,000
Program Open Space	21,602,750
Rural Legacy Program	9,370,500
Chesapeake Bay 2010 Trust Fund	0
Oyster Habitat Restoration Projects	7,600,000
Agricultural Land Preservation Program	19,477,023
Maryland Agricultural Cost Share Program	2,000,000
Total	**93,332,273**

Fund Type Summary	
	FY 2016 Actual
General Fund	48,775,912
Special Fund	267,984,471
Federal Fund	54,873,897
Reimbursable Funds	25,229,688
Current Unrestricted	11,729,446
Current Restricted	8,187,388
GO Bonds	93,332,273
MDOT	225,126,909
Total	**735,239,984**

Spending Category	
	FY 2016 Actual
Land Preservation	59,863,593
Septic Systems	20,914,791
Wastewater Treatment	260,347,439
Urban Stormwater	9,582,588
Agricultural BMPs	68,843,396
Oyster Restoration	11,084,013
Transit & Sustainable Transportation Alternatives*	225,126,909
Living Resources	41,566,711
Education and Research*	23,583,779
Other	14,326,764
Total	**735,239,984**